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14. ABSTRACT

Project CHECO was established in 1962 to document and analyze air operations in Southeast Asia. Over the years the meaning of the acronym changed several times to reflect the escalation of operations: Current Historical Evaluation of Counterinsurgency Operations, Contemporary Historical Evaluation of Combat Operations and Contemporary Historical Examination of Current Operations. Project CHECO and other U. S. Air Force Historical study programs provided the Air Force with timely and lasting corporate insights into operational, conceptual and doctrinal lessons from the war in SEA.

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PROJECT
Contemporary
Historical
Examination of
Current
Operations
REPORT

AIRMUNITIONS IN SEAsia (U)

15 NOVEMBER 1969

HQ PACAF

Directorate, Tactical Evaluation
CHECO Division

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Prepared by:

MR ERNIE S. MONTAGLIANI

Project CHECO 7th AF, DOAC

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PROJECT CHECO REPORTS

The counterinsurgency and unconventional warfare environment of Southeast Asia has resulted in the employment of USAF airpower to meet a multitude of requirements. The varied applications of airpower have involved the full spectrum of USAF aerospace vehicles, support equipment, and manpower. As a result, there has been an accumulation of operational data and experiences that, as a priority, must be collected, documented, and analyzed as to current and future impact upon USAF policies, concepts, and doctrine.

Fortunately, the value of collecting and documenting our SEA experiences was recognized at an early date. In 1962, Hq USAF directed CINCPACAF to establish an activity that would be primarily responsive to Air Staff requirements and direction, and would provide timely and analytical studies of USAF combat operations in SEA.

Project CHECO, an acronym for Contemporary Historical Examination of Current Operations, was established to meet this Air Staff requirement. Managed by Hq PACAF, with elements at Hq 7AF and 7AF/13AF, Project CHECO provides a scholarly, "on-going" historical examination, documentation, and reporting on USAF policies, concepts, and doctrine in PACOM. This CHECO report is part of the overall documentation and examination which is being accomplished. Along with the other CHECO publications, this is an authentic source for an assessment of the effectiveness of USAF airpower in PACOM.

Milton B Adams

MILTON B. ADAMS, Major General, USAF
Chief of Staff

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DEPARTMENT OF THE AIR FORCE
HEADQUARTERS PACIFIC AIR FORCES
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REPLY TO ATTN OF: DOTEC

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Warren H. Peterson

WARREN H. PETERSON, Colonel, USAF
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FOREWORD

"Airmunitions in SEA" discusses the supply of air-delivered munitions to USAF units in Southeast Asia (SEA). Tracing the development of the supply system from 1965 to late 1969, it includes the problems which arose and actions taken to alleviate them. It addresses the storage, handling, and loading of airmunitions in RVN. Also included are selected problem areas confronting airmunitions personnel--quality control, manning, handling equipment, explosive safety--and the continuing effort to correct deficiencies.

CHAPTER I

EARLY AIRMUNITIONS SUPPLY

During the period 1961 to 1964, the USAF commitment to the Republic of Vietnam (RVN) was limited and the use of munitions was relatively light. Under these circumstances, the supply of munitions was not difficult. Basically, the Second Air Division and later, the 7AF, had operational control over all airmunitions in SEA, with the exception of those items used by the Strategic Air Command (SAC). An Ammunition Control Point (ACP) at Tan Son Nhut controlled all assets in SEA and directed the distribution of the munitions, requisitioning via the Military Standard Requisitioning and Issue Procedure (MILSTRIP) system. The Ogden Air Materiel Area (OOAMA) at Hill Air Force Base, Utah, controlled procurement and distribution of munitions in CONUS and directed shipments to SEA.[1/]

Shipment of the munitions to SEA, and ultimately to SVN, was by ship. The material went to Subic Bay in the Philippine Islands and was trucked to Clark AFB for storage. Later, based upon requirements, the munitions were trucked back to Subic Bay, loaded on LSTs and shipped to RVN.[2/]

The rudimentary supply system continued with little change through 1964; however, after the Gulf of Tonkin incident occurred in August 1964, it became apparent that these methods could not support the large forces being deployed. During the first part of 1965, the USAF flew sorties and expended ordnance at a rate which surpassed that of the Korean War. This created a continuing demand for large amounts of airmunitions and a number of critical, if temporary, shortages.[3/]

To cope with this problem, the USAF established an Ad Hoc committee to analyze munitions development and procurement. The USAF subsequently adopted a policy of strict allocation of certain munitions to each major command, brought World War II and Korean War-vintage bombs out of stock, and asked for increased production of new items. In late 1965, the Air Staff directed that war readiness materiel stocks (WRM) around the world be drawn upon. In addition, the Department of Defense (DOD) repurchased some munitions, especially general purpose bombs (GPs), from Allied armed forces and private companies.[4/]

The most significant improvement in the supply system itself during 1965 was the initiation of the SPECIAL EXPRESS, a system which eliminated the off-loading in the Philippines, keeping the vessels on "hold" as "floating warehouses"--until needed in Vietnam. Initially, the USAF leased 5 ships through the Military Sea Transport Service (MSTS); later it acquired 14 more, bringing the total to 19.[5/]

The SPECIAL EXPRESS system was a surface pipeline to SEA directly from CONUS. The ships were loaded at the Naval Weapons Station, Concord, California, stopped at Subic Bay for fuel, stores, and classified orders, and then were either held or sent to discharge points at Da Nang, Cam Ranh Bay, Phan Rang, Saigon, and Bangkok in Thailand.[6/]

The munitions supplied by the SPECIAL EXPRESS were allocated by a new method. Allocations Review Board meetings were convened, with representatives of the Strategic Air Command (SAC), Pacific Air Forces (PACAF), and Air Force Logistics Command (AFLC). The global munitions picture was taken into account as was the production of new items. Additionally, USAF planners began allowing

the allocations to be adjusted by the substitution of items for those not readily available or in short supply.[7]

The Allocation Review Board meetings predicted that the latter part of 1965 would be a critical period in the supply of airmunitions to SEA.[8] Outwardly, however, the munitions concept in the theater looked good. An Air Force Munitions Conference held at Washington, D.C. during January 1966 concluded that although the allocations would not meet the increasing requirements in some munitions, production would be able to satisfy the needs in most items.[9]

During the first three months of 1966, several problem areas appeared. The ships were spending an inordinate amount of time in SEA, and were required to offload at multiple ports, which led to confusion as to the assets on board. SPECIAL EXPRESS added to the confusion by requiring partial offloading and reshuffling of cargo. The Commander-in-Chief, Pacific Command (CINCPAC), noted in a message to the Joint Chiefs of Staff (JCS) that the system was deficient:[10]

> *"On balance, recognize disadvantages of the express system such as delayed turnarounds, limitation on orderly planning of RVN port workloads, less than maximum utilization of ship capacity, duplication of flexibility for response to high-priority requirements, and most significant, operations outside the control agencies which are established to prevent ship delays...."*

These were compounded by production slippages, delays in shipping, and a large accumulation of the munitions components (incomplete rounds) in RVN and offshore vessels. In March, OOAMA attempted to alleviate the incomplete round situation by high-priority SEA airlift--SEAIR--between CONUS and bases in RVN

and Thailand. Special lots of critical components were squeezed from the production schedules and then airlifted to SEA as soon as available. Additionally, OOAMA redoubled efforts to insure that SPECIAL EXPRESS carried only complete munitions items, while the ACP at 7AF attempted to match the components that were already available.[11/]

These measures were not enough; the situation came to a head in April 1966, when the first USAF sorties were canceled for lack of munitions.[12/] The furor that followed showed that bomb and ammunition shortages were politically, as well as operationally, sensitive. Under fire from Congress, Secretary of Defense, Robert S. McNamara, had admitted in January 1966 that in some cases the demand had exceeded the supply. During testimony before a Congressional committee, he said:[13/]

> *"I believe that no military operations in South Vietnam have been adversely affected by equipment or munition shortages. When I say that, I want to repeat what I said in my statement, that there were certain inventory levels that are below desired objectives, and therefore, are short in relation to the desired objectives. That is why we have inventory levels--to draw them down when we need them."*

When informed during the first week in April that a shortage indeed existed which was affecting operations, Secretary McNamara reacted by saying that he was "shocked" by the evidence of maldistribution of airmunitions and called for a conference to investigate the problems.[14/]

As a result of the April 1966 munitions shortage, a concerted effort was made to move all available items to SEA, an effort that was extended and later became known as the "PUSH" system. Instead of closely calculated

quantities being shipped through the SPECIAL EXPRESS at spaced intervals, PUSH involved the rushing of all production and stockpiled munitions to SEA to supply immediate needs and to build an operating stock level of 30 days. The JCS and CINCPAC monitored the munitions replenishment by allocating monthly expenditures and controlling consumption by 7AF. Their knowledge of worldwide assets and the new production in CONUS provided the basis for the distribution.[15/]

The PUSH system was sufficient to take care of most shortages by forcing a rapid buildup of munitions possessed by 7AF. By late 1966, however, problems developed with ships awaiting discharge and port congestion--what had been a shortage before now became a glut--and it was obvious that the PUSH system was no longer required.[16/]

CHAPTER II

THE PULL SYSTEM

The huge increase in on-hand munitions during the latter part of 1966 had necessitated the discontinuance of the PUSH effort. The reduction of the surpluses to manageable size while still pushing critically short items called for new methods.

The new system, PULL, went into effect in early January 1967. It featured a projected monthly consumption which was calculated for each important item five months in advance, with a desired stock level of 45 days in RVN. Quantities were requisitioned monthly in the amount necessary to achieve the level at the end of month.[1/]

Two basic documents were published by PACAF to provide the general guidelines for programming, requisitioning, and storage of the airmunitions items. These were the PACAF Airmunition Planning and Programming Guide and PACAF Letter 136-2.[2/]

The purpose of the Planning Guide was to establish stockage objectives and distribution procedures in SEA. It was designed to assist all Department of Defense (DOD) agencies including PACAF organizations in their planning for munitions support within the scope of joint services regulations and agreements.[3/]

The Planning Guide included yearly expenditure and resupply requirements, showing how they were developed from force deployment, preferred ordnance load factors, and sortie rates. It showed storage requirements by base, equal to the 45-day op-stock plus 15 percent to allow for overstocked, test, and special

purpose munitions. Historical data were included in the guide as an aid in the future development of munitions load factors and target area sortie assignments. Finally, the guide contained current WRM status at each PACAF rear area base as a ready reference and a reminder that WRM stocks should always be considered at all levels.[4]

The second document, PACAF Letter 136-2, provided the guidance and direction for conventional munitions support in SEA. Basically, it outlined the three methods of resupply available under the PULL system. The first was the PUSH items which CINCPAC retained for allocation to the services. Secondly, the letter listed the PULL items on which CINCPAC had relinquished requisitioning control--PACAF would compute these items based on reports from the theater and provide the quantities required. Thirdly, the letter provided for supply of load crew training items, cartridge actuation devices, and bits and pieces to be requisitioned through the ACP.[5]

The PULL system involved doing away with the SPECIAL EXPRESS concept. The vessels formerly assigned to SPECIAL EXPRESS were integrated into a common-use system managed by the Military Sea Transport Service (MSTS), and the U.S. Army assumed responsibility for discharging it. The PULL system programmed the vessels more efficiently, ideally to one or perhaps two ports, allowing quick turnaround and minimum time at the docks. This more efficient transport system insured that if the munitions were available in CONUS, they would be available in RVN in a predictable manner, with minimum bottlenecks.[6]

The management of munitions allocations and expenditures under the PULL

system assumed a high degree of sophistication. The Directorate of Tactics and Combat System (DOT) at 7AF was the executive agency for management of the monthly allocation, the establishment of expenditures, and for forwarding quantitative requirements to CINCPACAF.[7] These were determined from operational and contingency plans at 7AF, with a 7AF Airmunitions Planning Board acting as coordinating agency;[8] qualitative requirements, on the other hand, were the responsibility of the 7AF Directorate of Plans and Requirements (DPLR), primarily in the area on new munitions.[9]

The management of the supply system was the responsibility of the Directorate of Airmunitions (DMW), under the Deputy Chief of Staff, Materiel (DM) at Hq 7AF. From the office at Tan Son Nhut, DMW orchestrated the entire airmunitions effort; besides being concerned with the PULL system, it provided technical guidance on related munitions areas, performed malfunction analysis, and assisted with the introduction of the new munitions.[10]

The Directorate of Airmunitions was subdivided into the following: Munitions Operations Division (DMWO), concerned with munitions storage, quality assurance, technical guidance to the field units; the Airmunitions Control Point (DMWA), running the management, and automatic distribution of controlled munitions; the Airmunitions Services Division (DMWS) tasked with providing technical guidance and planning data pertaining to munitions loading, aircraft weapons release systems performing follow-ups on emergency unsatisfactory reports (EURs) and gathering data on reliability of weapons release systems and associated munitions; and lastly the Explosive Ordnance Disposal Division (DMWE), which managed the 7AF Explosive Ordnance Disposal (EOD) program.[11]

By June 1967, airmunitions management was running smoothly, a far cry from the crash program of early 1966, and the mounting surpluses arising later that year. From that time until December 1969, the basic system remained; problems continued to be resolved and essential adjustments were made.

One of these adjustments came about in February 1968, when an AFK Management Branch was established, with the prime function of staff assistance to field units and standardization of munitions accounting and reporting procedures. Also in February, the ACP at Tan Son Nhut received a direct hit from a 122-mm rocket which resulted in complete loss of power and communications and extensive damage to other facilities. Limited ACP functions were initiated within eight hours, with full operations resuming in less than 24 hours.[12/]

The Presidential restriction of bombing north of the 19-degree parallel in North Vietnam (NVN) in April 1968 necessitated an adjustment in supply. Contrary to what might have been expected, the bombing restriction brought about a significant increase in ordnance expenditure and total munitions requirements. By 1 July, the expenditure pattern had stabilized and AF planners recognized certain program deficiencies. Quickly, a working-level munitions conference was held at OOAMA and as a result, 7AF monthly allocations were changed to conform with the new requirements.[13/] On 1 November 1968, the President announced the total bombing halt in NVN; sortie rates for Thailand-based aircraft began a small increase, and rates for those in-country declined. Again, the airmunitions supply picture was modified because of the new operational factors.[14/]

In 1969, the PULL system experienced additional modifications in various areas, one of which was in the Airmunitions Reporting Management System (ARMS). A program--DO-78--was devised and put into effect which eliminated the previous manual reporting system (EARFLAP), and brought about a saving of manhours in reporting procedures.[15/]

Another modification involved the conversion of certain airmunitions from airlift to sealift. On 28 January 1969, the Airmunitions Control Point submitted a schedule to PACAF for bringing an item by sea instead of by air, and on 5 March proposed another conversion--DMWA calculated that the two actions would save more than $3.5 million during the calendar year.[16/] Scheduling by vessel also permitted the 7AF to more firmly control supply of the items, which was not possible with the limited information provided from somewhat erratic airlift scheduling.[17/]

The complexity of the airmunitions program also received attention during 1969. In January, Gen. George S. Brown, the Seventh Air Force Commander, directed a study be made to determine the feasibility of reducing weapons proliferation, i.e., the number of different types at each base. On 3 March, personnel from DPL briefed the General and his staff on the findings of the study group. Basically, the recommendations called for a two-phased approach to the problem. Phase I included short term solutions which could readily be implemented by 7AF; it reduced the number of different types of ordnance items stored and used at each base. Phase II addressed long-term development efforts which would result in reduced weapons complexity in the form of Southeast Asia Operational Requirements for the standardized hardware.[18/]

After reviewing the proposals, General Brown ordered immediate implementation of the program; shortly thereafter, DMWA responded by terminating shipments of certain items to bases in Thailand, thus beginning Phase I. Action by DMWA, centering on weapons proliferation, continued as 1969 drew to a close.[19/]

The PULL system of 1969 was the culmination of years of experience gained in airmunitions resupply. In response to a question about its condition in November 1969, Brig. Gen. Paul F. Patch, the 7AF Director of Materiel (DM), commented:[20/]

> *"...compared to the problems we had in the early period--1965 and 1966--the operation that we have today is what I consider to be a business as usual type activity. The operation is completely organized, is very well managed, the resources are brought in under controlled conditions, so that we know precisely what we have, where we have it, and what the pipeline will provide...In other words, the problems that brought us around to the need for a PUSH system have been overcome, and now we are going with the PULL system...So, it is as the difference between night and day--1965 as compared to what it is today...."*

CHAPTER III

STORAGE, HANDLING, AND LOADING

The supply of airmunitions allocated for Air Force use in RVN and Thailand was generally a stable, predictable operation under the PULL system. The ships came to designated ports, were offloaded, their cargoes were examined and prepared for shipment to the air bases (Fig. 1). The responsibility for the movement to the air bases rested with the U.S. Army Transportation Corps.[1/]

There were five Traffic Regions in RVN which were run by the MACV Traffic Management Agency--the first, corresponding to I Corps, the second and fourth, dividing the II Corps Tactical Zone (CTZ), the third, comprising III CTZ, and the fifth encompassed the Delta or IV Corps. The mission of the Traffic Regions was to commit common service transportation assets, including U.S. Army trucks, U.S. Navy barges, and barges from commercial carriers to the movement of supplies in RVN. Specific assets, however, were not formally allocated to carry airmunitions to Air Force installations. As the Manager of the 3d Traffic Region stated, "USAF ammunition constitutes only about three to six percent of our total, so we move it as it comes in...."[2/]

Security involved in the movement was a problem, but fortunately land lines of communications (LOCs) in RVN were short--the longest one involving airmunitions was from Qui Nhon to Pleiku (Fig. 1). These in-country LOCs were subject to hostile action, as were the water routes, and the munitions were subject to some pilferage.[3/] The situation in Thailand was different. The primary point of entry into the country was at the ports of Sattahip and

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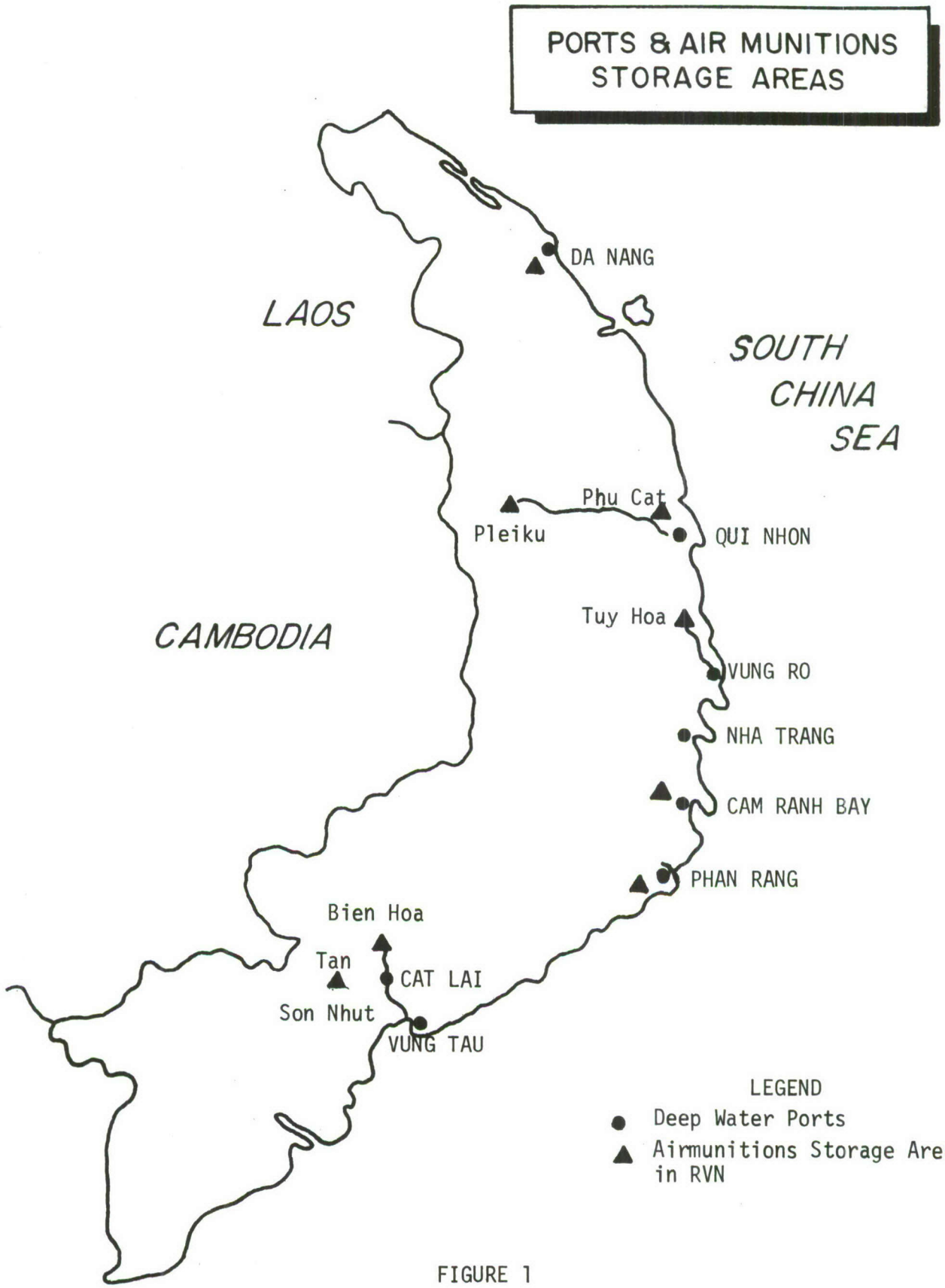

FIGURE 1

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Vayama on the Gulf of Siam.[4] The distances from there to the up-country bases were long (Fig. 2) and the airmunitions were carried mostly by a Thai company, the Express Transportation Organization (ETO), with Lt. Gen. Jitt Sundhanond, President.[5] Apparently, due to past pilferage and shortages brought on by United States' use of Thai contractors, the 9th Logistical Command (U.S. Army manager of transportation in Thailand), categorized small caliber ammunitions and other sensitive items as BLUE STAR--which meant that special security procedures had to be taken to move the munitions. Continuous attention was required to insure that BLUE STAR items arrived at their appointed destination up-country.[6]

The USAF role in the storage, handling, and loading of airdelivered munitions began with the arrival of the ordnance at the air bases. In some instances, rough handling during transportation was noted--an example of this was the arrival of damaged rockets to Bien Hoa AB in late 1969. Capt. James Hunter, OIC of the Storage area at the base, explained:[7]

> *"...the 2.75 rockets were piled too high in a barge and the load wouldn't fit under one of the bridges.... The barge struck the bridge and destroyed 16 pallets of rockets. The rockets arrived here with boxes and pallets broken--consequently the rockets were suspect.... We have sent in an Ammunition Disposition Report (ADR) ....Out of a normal shipload, there is always ADR material...."*

Other examples of rough handling included reckless driving of munitions--carrying trucks, and lack of prescribed tiedowns observed as the ordnance was driven onto the BHAB storage area.

The storage areas--"Bomb Dumps"--were organic elements of the Munitions Maintenance Squadrons (MMS) assigned to the major air bases. The Bomb Dumps were the sites to which airmunitions were originally sent and kept until needed for operational requirements. They were under control of the Maintenance Supervisors of the MMS and were organized in two sections, the Storage Section and the Maintenance Section.[8/]

The Storage Sections were charged with the responsibility of providing safe storage of all airmunitions on the air bases. Basic operating procedures relative to safe storage were explained in Air Force Manual (AFM) 127-100, USAF Stock Lists, and applicable technical orders. The procedures included guidelines for Net Explosive Weights (NEW), weapons compatibility, site construction, manufacturing and loading; in general, all of the necessary criteria for safe operations involving conventional explosives.[9/]

The physical layouts of Storage Sections in RVN were characterized by a general lack of space. As the Deputy Chief of Staff, Materiel, Brig. Gen. Paul F. Patch, commented, "...it's a real estate problem...."[10/] The lack of space necessitated NEW waivers at most bases in the theater; BHAB, for example was operating in late 1969 under a total of 17, with other air installations having similar numbers of waivers as a matter of course.[11/]

The storage areas were periodically affected by operational factors. During the first part of 1969, there had been a general under expenditure of airmunitions in the theater, caused by the following factors:[12/]

THE TRANSPORTATION SYSTEMIN THAILAND

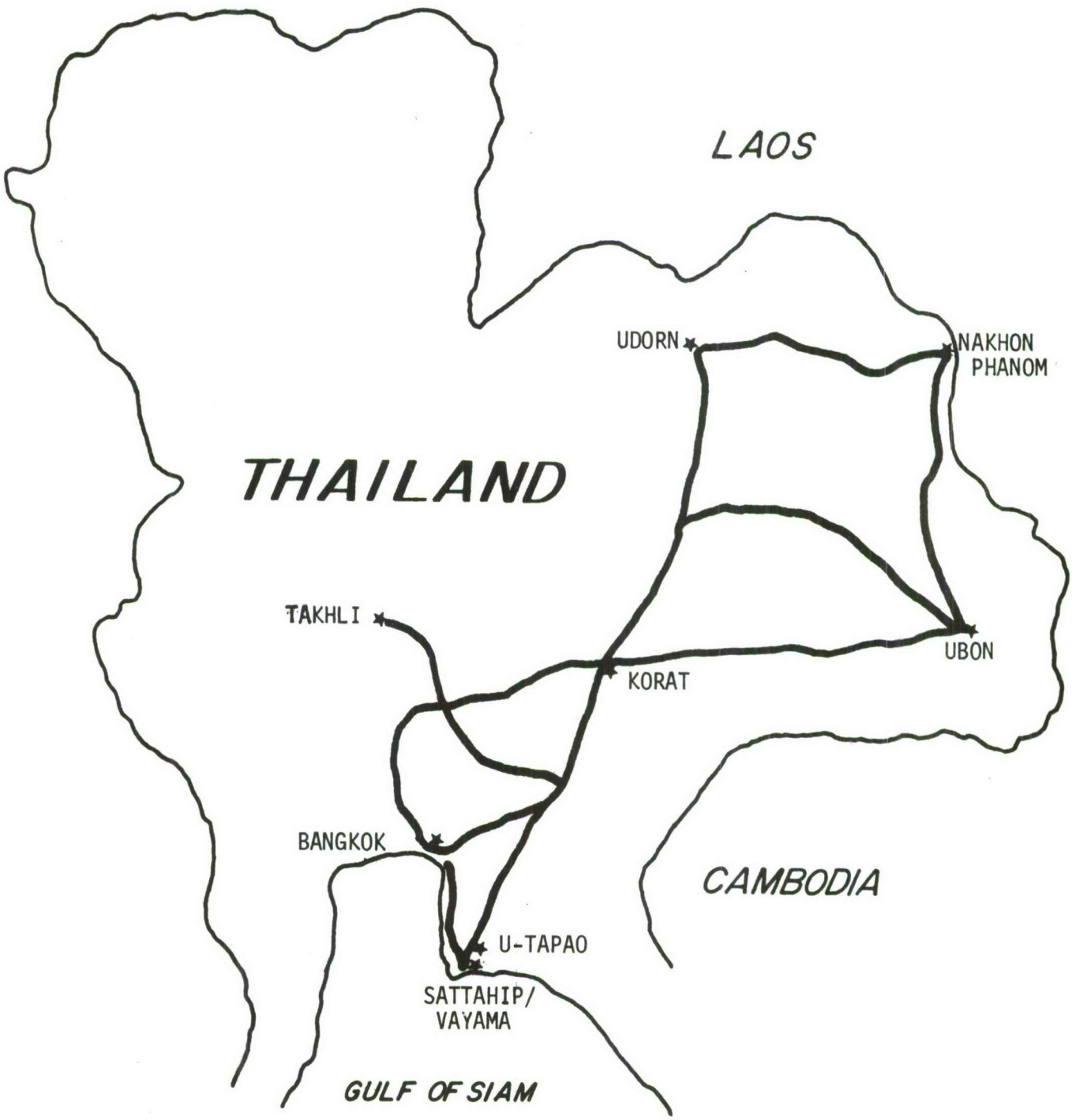

FIGURE 2

- The 7th AF had a reduced capability to expend. The departure of two F-100 squadrons from Phu Cat and the diversion of F-4Es to Korea in April left the 7AF short three squadrons for which air-munitions had been programmed.

- The storage area at Da Nang exploded, reducing the capacity there, and causing a diversion from Da Nang of scheduled items.

- Net explosive weight limits for all bases in RVN were reduced.

These combined to produce a complete saturation of the tactical storage facilities. Additionally, the holding vessels themselves adversely contributed to the situation. Although the bases could not accept the high explosive items such as hard bombs and cluster bomb units (CBUs), they were short of rockets, flares, small arms ammunition, and launchers which were also part of the cargoes of ships. Consequently, the short items had to be obtained from other bases in-country until the vessels could berth and be unloaded, causing an imbalance at the bases which supplied the necessary items.[13/]

The 7AF took immediate action--a recomputation of future airmunitions requirements followed by cancellation of numbers of items from the allocations. These along with utilization of storage areas at Vayama, Thailand, and Cam Ranh Bay, as alternate depots for ships unable to unload their original destinations, were the short-term solutions.[14/]

A long-term solution was needed. In response, 7AF Airmunitions and Transportation personnel conducted a joint study to determine the feasibility of using two types of munitions vessels. They recommended to PACAF that "Selected Vessel Loading" be instituted, i.e., one kind of ship be programmed to SEA with

only hard bombs and components, with the second type being sent with other items--those which had been in short supply earlier.[15/]

The Director of Airmunitions at 7AF recommended a second long-term solution in his End-of-Tour Report. He called for the establishment of forward stockpiles in SEA of sufficient size to be able to receive overages from vessels which had been unable to discharge at designated ports. These forward dumps would also contain enough ordnance to meet operational surge requirements. He further noted that such forward storage points would meet a strategic need, supporting any future contingencies until supply lines could be opened and production bases be revitalized. The Director's proposal concluded with the following statement:[16/]

> *"...a second advantage to this forward operating area would be that a trained cadre on munitions personnel, complete with equipment, would be maintained to support a sudden requirement and maintain continuity until the arrival of personnel deployed for support functions...."*

The storage situation in SEA, as had been seen, was characterized by lack of space. The Storage Sections of the MMS in RVN felt the full weight of this limitation, and it was considered to be a continuing factor with little or no hope of complete resolution.[17/]

The storage areas under the MMS also included Munitions Maintenance Sections, with the primary responsibility of assembling all ordnance flown from the air bases. The maintenance sections were divided into four main parts: (1) Bomb Preparation; (2) Napalm Assembly; (3) Rocket Assembly; and (4) CBU Assembly. Briefly, these elements finned and put tail fuzes into bombs,

assembled and filled Napalm containers, put rocket components together and checked the completed items, as well as prepared CBUs as necessary. Thus, the airmunitions were ready for delivery to the Ready Explosive Facility near the flight line.[18/]

The munitions were transported from the storage area to the ready explosive facility (also, holding area) automatically. When the latter area needed replenishment, the required items were sent. A one-day supply of ordnance was kept in the holding area until needed for the frag or alert pads. After receiving the operational requirements, the munitions were driven to the flight line and placed inside the aircraft revetments on bomb stands, usually three hours before takeoff. The fuzes and arming wires were brought to the revetments separately and were placed in bins before the loading activity began.[19/]

Prior to May 1969, the weapons loading crews were assigned to individual Tactical Fighter Squadrons (TFS). During March, 7AF conducted a comprehensive survey to investigate the feasibility of reassigning the crews to the MMS. Based on the survey, the 7AF forwarded to PACAF a recommendation that the loading crew/weapons standardization personnel be consolidated under the MMS concept. The survey had revealed that the following benefits would be realized by the organizational change:[20/]

- A single point of contact would be provided for the Chiefs on Maintenance through the MMS Commanders for the management of all 462X0 (Munitions Loading) personnel.
- An increased round-the-clock supervision of weapons loading and release personnel would be possible through additional flexibility in assignment of

experienced NCOs and senior supervisors.

- There would be a significantly increased capability to provide the maximum of load crews during critical manning periods.
- Explosive safety and standardization in procedures would be more effective through centralized management.
- There would be a significant reduction in facilities, vehicles, and equipment needed to maintain the required load crews and a better coordinated working relationship among all concerned.

The proposal was accepted and PACAF immediately requested a waiver to AFM 26-2 which was approved by Hq USAF. PACAF then notified all SEA units to realign the 462XO personnel into the Munitions Maintenance Sections by 15 May 1969.[21]

Significant improvements were noted in the utilization of loading crew resources, equipment, vehicles, and facilities, as had been predicted.

These improvements were not the only ones noted, as was shown by the experience of the 366th Tactical Fighter Wing at Da Nang.[22] It reported that its crews had been working 12 hours a day, seven days a week prior to the reorganization; after 15 May, each crew was able to take one day off per week. The Maintenance Supervisor of the 303d MMS at BHAB credited the reorganization with an overall beneficial effect:[23]

> *"...I would like to comment on the return of the load crews to the MMS....Last month, we had an inspection and there were no significant deficiencies noted....I guess that was the only time in SEA that an entire loading and handling operation has had none...."*

Typically, the MMS had crews for each kind of aircraft possessed, assigned on the basis of certification in aircraft type--for example, the 303d MMS, in November 1969, had nine F-100 and eleven A-37 loadcrews.[24/]

The crews were sent to the aircraft revetments from two to two and one-half hours before scheduled takeoff time, with bomb-lifts and the tools necessary for loading. The munitions were then "prepped"--arming wires and drive assemblies installed--followed by the loading operation. All procedures drew close attention throughout the conflict in RVN to minimize the danger involved--they were accomplished in accordance with the provisions of PACAFM 50-7, PADAVAFR 136-16, and PACAF Supplement to AFM 66-1. Additionally, the loading operations followed appropriate USAF checklists and lastly, the munitions were fuzed in accordance with the frag.[25/] The last step in the process--the removal of safety devices--took place at a facility near the ends of the runways, as the aircraft prepared for takeoff.

In summary, by late 1969, the supply of airmunitions to USAF bases in RVN was relatively stable. The storage, handling, and loading areas as well as procedures in all three areas were operating fairly efficiently and safely, with only minor faults. As the report of an Explosives Safety Staff Assistance Team which had visited selected PACAF units in August 1969 stated, "General improvement in all facets of munitions operations was noted over that observed....[in] November-December 1968."[26/]

CHAPTER IV

PROBLEMS AND CORRECTIVE ACTIONS

Several significant problem areas were encountered during the operation of the airmunitions program in SEA. Some were beyond the control of the Air Force. The problems existed over the entire range of the airmunitions spectrum. They called for recurring corrective actions, many recommendations to higher command, and continuing adjustments.

Manpower in Airmunitions

Except for the period of the Korean War, there was little emphasis given to conventional ordnance, from the development of new items to the training of large numbers of personnel. The entry of the U.S. into the Vietnam conflict with its subsequent increased force deployments focused attention on conventional airmunitions. In the years that followed, the conventional weapons field progressed from a "bombs and bullets" technology to a highly complex and sophisticated system.[1/]

The managers of the system, i.e., the airmunitions officers in SEA, historically had minimum experience in the conventional field, other than through the basic Aerospace Munitions Course at Lowry AFB, Colo., and the one-month refresher course given to officers destined for Southeast Asia. Also, prior to arrival in the theater, the office to which these men were being assigned had no way of determining their experience in munitions and making assignments accordingly. Consequently, time was spent in most cases learning jobs in which the individuals had no past competence. As Lt. Col. Glen F. Morgan,

the Deputy Director of Airmunitions, 7AF, commented:[2]

> *"My own experience was in nuclear /weapons/ from 1945 until I came over here....I carried on my own training program with respect to the job I was to do. This is not uncommon at the Staff Officer level...and it is not the most desirable situation...."*

These experiences in filling airmunitions officer assignments in SEA called for some way of determining the individual's previous specialties, hopefully to keep malassignments to a minimum. The Director of Airmunitions at 7AF recommended that separate Air Force Specialty Codes (AFSC) be established for both Conventional Munitions and Nuclear Weapons Officers at Company and Field Grade levels. He concluded by requesting a study to properly address the problem.[3] General Patch supported this view, commenting, "...this area has to be given some attention in the future...."[4]

The airmen in the airmunitions program were operating under a somewhat similar situation. In these cases, the AF had to crosstrain large numbers of men from other fields to get the amount necessary to handle the increasingly complex and sophisticated items.[5] But original AFSC for munitions handlers (462X0) was no longer considered valid. Even though an airman was trained as 462X0, he was not familiar with the entire field which had become too broad and complex. Col. William Cameron,III, Director of Airmunitions, Hq 7AF, and others at DMW recognized the fact and made recommendations in this area also.[6]

Munitions Handling Equipment

The Munitions Handling Equipment (MHE) used by the USAF in RVN presented a major and continuing problem stemming basically from the fact that the vehicles

were commercial-type, off-the-shelf items which had not been built to military specifications.[7] These vehicles had been designed to run six to eight hours per day with normal daily maintenance provided after that. The munitions operations in RVN, on the other hand, taxed the vehicles far beyond their designed use; some of the vehicles were being operated 16 to 22 hours out of 24.[8]

Consequently, the vehicles broke down. The need for repair further compounded the situation--not only were the vehicles commercial types, they were of many makes and models, each requiring different parts, supplies, and repair procedures. The acquisition of the needed repair parts and the unfamiliarity of maintenance personnel with the many types caused widespread delay in returning the vehicles to the job. The Munitions Maintenance Squadrons found themselves short of vehicles on a continuing basis.[9]

The Maintenance Supervisor of the 303d MMS identified the vehicles prone to breakdowns at BHAB:[10]

> *"The Rough Terrain (RT) forklift has been an awful thing to try to keep in commission. We have two of our eight running at this time (November 1969). I think that this number is about normal....*
>
> *"The H-11 Crane is another piece of junk. It just will not stand up to the use required in SEA. Another one is the H-tractor....Out of the seven that we have, if two are running we are lucky...."*

The vehicle status figures throughout RVN generally reflected the experience of the 303d MMS. The figures for November 1969 which were kept at the Munitions Operations Division (DMWO) at Hq 7AF showed a country-wide

in-commission rate for RT forklifts and H-11 Cranes were 59 and 63 percent, respectively.[11/]

As low as these figures appeared to be, they actually were much better than they had been in the past. DMWO had taken continuous corrective action to raise the in-commission rates for these vehicles. There had been a tendency by MMS personnel to go to the nearest U.S. Army maintenance unit and "borrow" parts when repairs were necessary. Thus, the parts requirements for the vehicles were never brought to the attention of the USAF system. DMWO "convinced" the MMS personnel that they should request the parts from their own system so that automatic stockage and resupply procedures could be developed.[12/]

Concurrently, DMWO succeeded in having the prime munitions handling vehicles placed on a "Red Priority" status at the repair shops similar to the status of fire trucks and ambulances. Under "Red Priority," the shops were required to repair the vehicles as soon as possible.[13/]

Additional corrective measures were taken, such as assigning vehicles of one type to one area of RVN and recommending central in-country parts depots, all the while calling attention to the deficiencies of commercial vehicles.[14/] The consensus among munitions personnel at all levels of command was that the problems could be resolved by using the M-Series vehicles.[15/] These vehicles were built to military specifications based upon operational requirements. They had standardized parts and maintenance procedures. Lt. Col Lamar V. Stevenson, Commanding Officer of the Army's 3d Traffic Region, was emphatic about the feeling among munitions personnel when he stated: "...I'm sure that we will

have to return to the M-Series-type of vehicles...."[16/]

Quality Control and Design Deficiencies

The 7AF had to deal with large numbers of defective airmunitions during the war in RVN. These items caused serious logistical and maintenance problems, and affected operations against the enemy.[17/]

The discovery of the defective munitions invariably came as the items were expended. The munitions personnel at the air bases then submitted Emergency Unsatisfactory Reports (EUR) and Ammunition Disposition Reports (ADR) stating the problems encountered and identifying the munitions by manufacturer and lot number. The lots were then suspended pending disposition.[18/] This suspension had its effect upon the various aspects of airmunitions supply; the ordnance took up needed space at the storage facilities, which in turn affected the ability of the Bomb Dumps to store additional supplies. Many times replacement of the suspended ordnance was not immediately possible and extensive "field fixes" were required to return the items to a serviceable condition. As Gen. Paul F. Patch said:[19/]

> *"If we stopped and modified the munitions, then our men were not being used for the purpose for which they were sent over here. It is something that we should not have had to contend with over here...."*

Where the field fixes were impractical, provisions were made to remove the defective items from the theater, and efforts had to be made to replace them with stocks from other bases in SEA or in CONUS. Thus, requirements for storage, extraordinary personnel utilization for "fixes," and continuous re-distribution of stocks presented great difficulties and incurred great expense.[20/]

For example, on 12 December 1968, problems involving broken lugs on BLU-27/B firebombs were noted at the tactical bases. Within a short time, four munitions lots were identified as having high instances of lug failure,[21] and more than 6,300 of the bombs were suspended.[22] The 7AF DMW designed and submitted to PACAF a field-fix in early 1969 which called for the use of a heavy-gauge steel band around the outside of the bomb casing, somewhat similar to a sling. The recommendation was adopted and kits for the modifications were distributed to the bases during March. The cause of the failure of the lugs was laid to hydrogen embrittlement in the metal or faulty heat treatment at the production facility--the total cost of the modifications to the 6,300 items was $158,374.00.[23]

Further problems with the BLU-27 and BLU-23/32 firebombs existed on a continuing basis, primarily in the internal ignition system. These were somewhat alleviated by installation of a cable kit which transferred the electrical ignition impulses from the internal system to external wiring; however, the kits themselves were found to be poorly constructed. In this case, not only were the original items deficient; the fixes supplied to correct them were bad.[24]

Fin assemblies also suffered from lack of quality control. In June 1969, field units began receiving MAU-93 conical fins with the rear fuze-drive assembly access holes positioned 7/16 of an inch too far to the rear. Consequently, the regular four-inch drive shafts were too short and could not be used. During late July, a new five-inch shaft was designed to correct the error and results were excellent. The incorrect dimension was traced to a

drawing-board error, which rendered approximately 300,000 fins unserviceable until the defect was located and a field-fix installed.[25/]

Another fin problem arose in July 1969 when the air bases began reporting the MK-15, Mod 1 retard fins could not be mated with MK-82 500-lb. bombs. In this case, investigation revealed the deficiencies were multiple; retainer ring openings were cut out of tolerance, fin supports were too long or too short to allow proper alignment, and grooves for locking rings were not cut deep enough or the diameter of fin supports was too small.[26/]

A new retaining ring was obtained from U.S. Marine Corps stocks at the end of September which permitted the use of 8,500 retard fins that had previously been unserviceable. The USAF programmed production of the Marine retainer ring for October, and directed that the fins not already shipped to SEA be returned to the manufacturers for adjustment.[27/]

Flares were another item susceptible to poor quality control and design deficiency. During February 1969, the MK-24 dud rate stood at 34.6 percent (598 flares dispensed with 207 duds), when dropped from AC-119G aircraft. Inspection revealed two contributing factors: improper safety-pin attachment and failure of the pins prior to complete extraction from the ignition dial.[28/]

The first corrective action by DMW personnel was an intensive training program in the loading, handling, and dispensing of the flares, along with a complete review of installation procedures. This, however, did not decrease the dud rates appreciably. A suggestion from the field was then tried in which a second safety-pin extraction ring was installed through the second loop in the

pin. This reduced the dud rate to zero on several subsequent flights, and widespread use of the new fix later reduced the overall dud-rate to an acceptable four percent.[29]

Flare problems cropped up again during September and October 1969. The bases in RVN and Thailand reported a setting deficiency when the flares were not locked on safe as they were removed from their containers. Additionally, the flares could not be set once the dials were depressed. An EUR was submitted to OOAMA and the lots were suspended. Inspection of other lots revealed that the problems were common to all flares made by the Bermite Company and later those supplied by the Kilgore Corporation.[30]

The 7AF took emergency action to resupply the bases in Thailand with serviceable flares. Concurrently, a special lot inventory requested by the 7AF showed that Bermite flares constituted 23 percent of the total stock in SEA. It was determined, however, that sufficient good flares produced by other companies were available to support operational requirements as long as nothing else went wrong with the items.[31]

A major problem, attributed more to design deficiency rather than quality control, took place during 1968 and 1969. Numerous incidents occurred which caused damage to F-4 aircraft during jettison of stores from Multiple Ejector Racks (MERs) on outboard stations. As an interim solution, the 7AF authorized the attachment of an unfuzed, unfinned MK-85 500-lb. bomb on Station One of the MER as a ballast. This added weight caused the MER to fall away from the aircraft, rather than allowing it to fly up and strike the control surfaces as

was the case in the past.[32]

This practice was discontinued when OOAMA directed the use of different cartridges in the ejector mechanism, giving the MER a greater "kick" upon jettison. In addition, 7AF initiated a new torquing procedure to insure that the ordnance on the MER stations would not bind and cause a hang up. As of December 1969, the jettison problem still existed, although the corrective actions had reduced the number of incidents. The problem remained one of grave concern to Seventh Air Force and higher headquarters. A special board with representatives from all major headquarters using F-4s and Air Materiel Areas (AMA) was formed to address the problem, and actions to find a permanent solution continued during late 1969.[33]

There were numerous other problems stemming from quality control and design deficiencies. These included: (1) suspension of 4,000 CBU-46s because of defective firing pins; (2) suspension of CBU-2s and BLU-3s from in-country use because of a high dud rate;[34] (3) the discovery of 18 known deficiencies in the FMU-56 fuze, necessitated a new design;[35] and (4) an unacceptable number of proper detonations for the BLU-72 bombs, also made a new design necessary.[36] These examples do not include instances of trouble with weapons release systems, gun systems, and gun ammunition which had not been corrected before the items were sent to SEA for issue to a tactical command.[37] The quality control problem according to 7AF was due to "unbearable negligence of contractor production responsibilities.[38] The Director of Airmunitions was explicit on this point:[39]

> *"The majority of the problems stemmed from one factor...completely inadequate quality assurance programs by the manufacturers....The simple fact is that the problems would have never happened had an adequate quality control program been enforced."*

Brig. Gen. Paul F. Patch supported the views of his subordinates:[40/]

> *"It has been our experience here that the production of airmunitions has not had the quality control that it should have. We have run into a number of problems with the munitions that have been due to poor quality control at the production facility....It continues to be a problem ...."*

Explosive Safety

During the war in RVN, munitions personnel at 7AF were highly concerned about the possibility of a major explosive accident. Consequently, offices involved in the many aspects of airmunitions paid continuing close attention to programs of safety and prevention.

Centralized guidance for the programs was provided in 1969 by a 7AF Explosives Review Board. The Board was chaired by the 7AF Director of Safety (DS) with senior representatives of DM, DO, DP, and the Security Police (IGS) in attendance.[41/]

Because the reporting of explosives accidents/incidents covered such a wide spectrum--faulty munitions, base defense munitions, release systems, personnel error, transportation and handling--7AF planners considered the most feasible reporting procedure to be an analysis of each instance by cause factor and category.[42/]

An overview of the explosive mishap trend for 1968 by cause factor revealed materiel failure accounted for 56.5 percent of all incidents, with the major offenders being release systems, CBU predetonations, and 2.75-inch rocket malfunctions. To correct these deficiencies, F-100 release systems were modified, a new intervolmeter was designed to provide a longer pause in the firing of rockets, and CBU-2s were discontinued.[43/]

The next classification of cause factor was the "unknown" category, which for 1968 included 22.1 percent of the incidents. This classification took in those incidents in which investigations had failed to determine primary causes, and available information could not be used to place the blame upon either materiel failure or personnel error.[44/]

The last cause factor was personnel error, which accounted for 21.4 percent of the explosive incidents during 1968. This category was used only after investigation revealed that an individual had deviated from prescribed procedures.[45/]

During 1968, the 7AF units experienced a total of 316 explosive/missile mishaps which resulted in damage to 60 aircraft and injury to six personnel. Of these mishaps, 106 were reported as accidents and 210 were incidents.[46/]

During the first seven months of 1969, there were 255 explosive mishaps reported by 7AF units, which was a significant increase over the corresponding period in 1968. There were several reasons for the increase. In April 1968, a change to relevant Air Force Regulations redefined explosive mishaps, resulting in more being reported than was previously the case. Improvement was made in the reporting of mishaps by units involved in storage, loading,

and handling of airmunitions. Lastly, there was an increase in ordnance expended during the first few months of 1969 as compared with the same period in 1968.[47]

Gen. Joseph J. Nazzaro, Commander-in-Chief, Pacific Air Forces (CINCPACAF), expressed concern in a letter over the increase in the amount of mishaps reported in 1969. Gen. George S. Brown, 7AF Commander, received a copy of the letter and requested a briefing on all incidents, which was given in early September 1969.[48]

Other briefings were given by 7AF Safety personnel. On 11 September, Generals Nazzaro and Brown were presented with a detailed analysis of explosive accidents reported by F-4 units. On 1 October, briefings of the F-100 weapons system were presented. The results of these presentations were summed up by the 7AF Director of Weapons Safety:[49]

> *"I think that after the briefings, he /General Brown/ agreed that there was no major problem which we were not already aware of, but he wanted additional briefings that would put the overall accident /picture/ in perspective....Also, he said that with the masses of data it was very difficult to separate the more serious explosive accidents from the less serious ones...."*

The 7AF safety program had attracted other top-level attention. The Chief of USAF Explosive Safety conducted a staff assistance visit to 7AF bases during August 1969, and his report noted there was an active explosive accident prevention program throughout the command, along with a general improvement in all facets of munitions operations. He did, however, observe some unsafe practices at some of the bases resulting from noncompliance with established

procedures. Appropriate corrective actions were initiated on the discrepancies noted during the visit.[50/]

Effectiveness of the USAF safety programs since the beginning of the war in RVN was illustrated by one statistic: since 1965, there were only two major explosive disasters in the theater.

The first of these occurred during May 1965 at Bien Hoa Air Base, when a fully-loaded B-57 bomber exploded, setting off a chain reaction which killed 29 USAF personnel and wounded 150. While the cause of the initial blast was a matter of conjecture, the subsequent explosions were clearly due to unsafe conditions. The revetment program at BHAB had not been fully implemented at that time. This caused the loading of aircraft to be carried out as they were parked on the ramp, wing tip to wing tip. After the B-57s were loaded and fueled, they remained parked in the original positions until sorties were flown. The result was predictable--when one aircraft exploded, it triggered adjacent aircraft until the entire ramp was consumed. In addition to the personnel losses previously mentioned, the BHAB conflagration destroyed 15 aircraft and damaged 31.[51/]

The second major explosive accident of the SEA conflict occurred at Da Nang in April 1969. In this case, a brush fire on the perimeter of a U.S. Marine Ammunition Storage Point (ASP) set fire to some wooden boxes within the area. Small explosions took place, propelling burning debris into adjacent USAF and VNAF ASPs. A series of explosions then followed which virtually destroyed the ammunition storage area, and effectively closed Da Nang AB until the scattered materiel could be removed and the stocks replenished. The

overall damage assessment was 13 craters in revetments caused by high-order detonations, four revetments burned extensively, and eight were completely buried. Fortunately, because of timely and accurate decisions of commanders on the scene, there were no USAF fatalities and no damage to USAF aircraft.[52/]

CHAPTER V

SUMMARY

The airmunitions supply system in RVN was a product of long experience in support of tactical operations. From 1965 onward, USAF munitions planners sought to achieve the best and most responsive way of supplying ordnance to the units counteracting the enemy. This search culminated in the PULL system of late 1969--one which was characterized as "strictly user-oriented...and that's the way it had to be...." Brig. Gen. Paul F. Patch summed it up:[1/]

> *"As I have advised everybody that I've talked to on the subject...we have made greater strides in the management and control of munitions than we have in any other logistics function....*
>
> *"...we have a management system which will allow us to increase activity or slow it down as the situation demands...it is right now a completely controlled and managed system...."*

Though beset by problems throughout the war in RVN, the development and functioning of the supply system was a learning process. It provided an opportunity to train personnel and develop techniques under the stresses inherent in a war zone. This experience was invaluable and there was general agreement among 7AF airmunitions personnel that an attempt should be made to carry the lessons forward.[2/]

The Director of Airmunitions addressed the need for the continuation of the system into the future as he recommended transferring the ACP from Tan Son Nhut to U-Tapao upon termination of hostilities in RVN. There it would function as the Thirteenth Air Force Ammunition Control Point. This location would

allow the most effective distribution of munitions items to the bases in Thailand, and would best control the flow of assets in the event new tactical operations were necessary.[3/] As stated by the Director of Materiel: "...if another of this type of contingency evolves, all you do is expand this and you have a controlled way of doing business...."[4/]

FOOTNOTES

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GLOSSARY

ACP	Ammunition Control Point
ADR	Ammunition Disposition Report
AFM	Air Force Manual
AFR	Air Force Regulation
AFSC	Air Force Specialty Code
ARMS	Airmunitions Management System
ASP	Ammunition Storage Point
BHAB	Bien Hoa Air Base
CBU	Cluster Bomb Unit
CINCPAC	Commander-in-Chief, Pacific Command
CINCPACAF	Commander-in-Chief, Pacific Air Forces
CONUS	Continental United States
CTZ	Corps Tactical Zone
DM	Deputy Chief of Staff, Materiel
DMW	Directorate of Airmunitions
DMWA	Airmunitions Control Point
DMWE	Explosive Ordnance Disposal Division
DMWO	Munitions Operations Division
DMWS	Airmunitions Services Division
DOD	Department of Defense
DOT	Directorate of Tactics and Combat System
DPLR	Directorate of Plans and Requirements
DS	Director of Safety
EOD	Explosive Ordnance Disposal
ETO	Express Transportation Organization
EUR	Emergency Unsatisfactory Report
IGS	Security Police
JCS	Joint Chiefs of Staff
LOC	Line of Communications
LST	Landing Ship, Tank
MER	Multiple Ejector Rack
MHE	Munitions Handling Equipment
MILSTRIP	Military Standard Requisitioning and Issue Procedure
MMS	Munitions Maintenance Squadron
MSTS	Military Sea Transportation Service

NEW	Net Explosive Weight
NVN	North Vietnam
OOAMA	Ogden Air Materiel Area
PACAF	Pacific Air Forces
RT	Rough Terrain
RVN	Republic of Vietnam
SAC	Strategic Air Command
SEA	Southeast Asia
SEAIR	Southeast Asia Airlift
TFS	Tactical Fighter Squadron
VNAF	Vietnamese Air Force
WRM	War Readiness Materiel